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# A GUIDEBOOK TO LEARNING

## For the Lifelong Pursuit of Wisdom

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CHAPTER 6

# The Middle Ages

*Thomas Aquinas* [1225–1274]

BOTH great Christian theologians, Aquinas and Augustine, differ in their discipleship—the former to Aristotle, the latter to Plato. They also differ in the times in which they lived Aquinas at the high point of the Middle Ages, Augustine at the very end of ancient civilization with the fall of Rome to the barbarians from the north.

These differences account for the different views they take of the place of theology, or what Aquinas called Sacred Doctrine, in the organization of knowledge.

Both men place the knowledge that comes with faith at the summit of everything that can be known; both regard such knowledge as supernatural in origin, a gift from God through the revelation of Himself to mankind. All other knowledge is acquired through the exercise of man's natural faculties, his senses and his intellect. But for Augustine, the knowledge acquired through faith, not through reason, is superior to scientific knowledge, which proceeds from premises it adopts to the demonstration of conclusions.

Aquinas, on the contrary, regards Sacred Doctrine or sacred theology as the very epitome of science. It receives its principles or premises from the articles of Christian faith, dogmatically de-

clared; and proceeds therefrom by rational processes to analyses, clarifications, and conclusions that provide the faithful with a better understanding of their religious beliefs. The rational processes whereby dogmatic or sacred theology is developed from the articles of faith call upon all the insights, distinctions, and arguments that philosophy can make available.

That is why Aquinas not only esteems theology as the queen of the sciences, but also praises philosophy as her indispensable handmaiden. In this conception of philosophy as theology's useful servant, philosophy encompasses more than metaphysics and ethics. It includes the sciences that comprise the range of natural knowledge.

Philosophy at its own twin summits in metaphysics and ethics confers upon mankind a modicum of theoretical and practical wisdom, but not enough for the Christian life, either in this world or for salvation in the next. Its deficiencies must be overcome by the superior wisdom that comes only with faith.

What kind of training and formation must be given the developing mind in order to prepare it to receive and embrace that superior wisdom? Where Augustine placed the study of grammar and rhetoric in the earliest stage of learning, Aquinas, as Master of Arts at the University of Paris in the thirteenth century, prepared his students for theology by reading to them from the philosophical works of Aristotle, and commenting on what he read, passage by passage.

For the students to follow his commentaries, they first had to be trained in what were then called the seven liberal arts. Although all seven had been recognized in one form or another by Plato and Aristotle, they were not formulated as a trivium and quadrivium of studies in Augustine's day. That came about in the medieval schools and universities of a later day.

The trivium comprised the three arts of grammar, rhetoric, and logic—the arts of using language correctly and effectively and the arts of using one's mind with precision, accuracy, and cogency. Logic was not only an art—a skill and a method; it was also a science that had principles of its own, definitions, distinctions, and axioms that established a host of rules—the laws of thought. The same can be said of rhetoric and grammar. They, too, were sciences as well as arts.

The remaining four of the seven liberal arts—the arts of the quadrivium—would appear at first blush to be mainly science:

arithmetic, geometry, astronomy (i.e., the mathematical science of the spheres), and music (i.e., the mathematical science of harmonics). But they, too, are arts, skills of the mind in operating with numbers and figures, ratios and proportions.

The seven liberal disciplines have their aspect as arts in the operational skills they confer upon the mind. They have their scientific aspect in the principles they appeal to and the rules or conclusions they establish. As arts, they provide us with intellectual know-how. As sciences, they give us knowledge about the intelligible objects that the mind contemplates when it reflects upon its own acts and its own conceptual abstractions.

## *Roger Bacon* [1214–1292]

A contemporary of Thomas Aquinas, and an associate of his at the University of Paris, to which he had come from the University of Oxford, Roger Bacon was far more a natural scientist than either a theologian or a metaphysician. We would, therefore, naturally expect from him a quite different approach to the organization of knowledge and to the order of learning.

In his *Opus Majus,* Bacon stressed the utility of the mathematical sciences in their application to astronomy, optics, chronology, and other disciplines. We find what, at this early date, may seem surprising to us—a call for the establishment of experimental science as a method of investigation and verification in our effort to know the facts of nature. And, as we might expect from a Franciscan friar, we find an acknowledgment of a close affinity between philosophy and theology, and the elevation of moral philosophy and theology to the apex of human learning because it treats of man's relation to God.

In another of Bacon's works, of which we have only portions left, the four extant volumes indicate an ascending order of subjects to be studied. They are: first, the arts of the trivium—grammar, rhetoric, and logic; second, the arts of the quadrivium, beginning with the common principles of mathematics and going on to its special branches—arithmetic, geometry, astronomy, and music; third, the whole range of the natural sciences, including optics, geography, alchemy, agriculture, medicine, and experimental science in general; and fourth, metaphysics and morals as the crowning subjects to be studied.

CHAPTER 7

# Modern Times: Seventeenth Century

*Francis Bacon* (1561—1626)

FRANCIS Bacon Baron Verulam, Keeper of the Privy Seal and Lord Chancellor of England—brought the talents of a judge and administrator to the philosophical problems he addressed. His personal physician, William Harvey, the discoverer of the circulation of the blood, said of him that he "wrote philosophy like a lord chancellor. "

Of the two books that established Bacon's reputation and spread his influence—*The Advancement of Learning*, published in 1605, and the Novum Organum, published in 1620—only the first concerns us here. It is of interest to us but not for the reason Bacon wrote it.

Bacon's principal aim was to take stock of the state of human knowledge in his day and to point out the areas in which there were deficiencies, these to be remedied for the sake of increasing the general store of human learning. In order to do that he had first to schematize the whole field of knowledge, indicating its several parts and their relationship to one another. His map or chart of human learning, which he himself referred to as a small globe of the intellectual world," had greater amplitude than those words imply. It was expansive and comprehensive.

The principle he employed in his organization of knowledge derived from the distinction of the human faculties—memory, imagination, and reason. From the exercise of these cognitive faculties all of the knowledge that man possesses by natural means is obtained. But man also has knowledge from another, a super-natural, source—divine revelation. Bacon did not treat the latter in any detail. Concerned with what needs to be done to advance human learning, his differentiation of the parts of knowledge fell principally within the first of these two spheres.

By reference to the three faculties of memory, imagination, and reason, Bacon distinguished history, poetry, and philosophy. His-

tory deals with the memorable past that has become a matter of record. Poetry for Bacon covers all the products of our imagination—the whole of imaginative literature, not just lyrics in verse, but all forms of narrative fiction, both dramatic and epic (which we now call plays and novels), whether written in prose or in verse.

As Bacon used the word "philosophy" it had a much broader connotation than it has today. It included all the forms of knowledge obtained by reason's reflections on human experience, aided in some instances by experimental investigation or inquiry. It took into account what we would call the sciences as well as what we would call the branches of philosophy. It also included the technological or productive results of experimental science and the various arts that involved other applications of science.

The fact, pointed out by Bacon's critics, that these three main parts of human knowledge do not stem exclusively from memory, imagination, and reason, does not, in my judgment, undermine his controlling insight. Of course, reason and imagination, as well as memory, enter into historical knowledge, both on the side of historical research and on the side of historical narration. But without the operation of memory, there would be no history. Similarly, memory and imagination enter into the philosophical or scientific enterprise in all its forms, but without the exercise of reason, there would be no philosophy or science. Reason and memory, too, play a part in the compositions of poetry, but without the play of imagination there would be no imaginative literature.

The point on which Bacon can be challenged and perhaps also corrected is the inclusion of poetry or imaginative literature as one of the three parts of human knowledge. That it is an essential component of human culture, and of learning in the broadest sense of that term, lies beyond question. But if knowledge is used in a narrower sense than learning, if it is used for what claims to be true of reality, where such claims are verifiable or falsifiable, then history and philosophy or science belong in the domain of knowledge, poetry does not.

On the other hand, it can be said that truth is more ample, that it includes poetic as well as scientific, philosophical, and historical truth. It includes truth about the possible as well as truth about the actual. On that basis, Bacon's inclusion of poetry along with history and philosophy in the domain of knowledge can be justified.

History, according to Bacon, has four subdivisions. The terms e use to name them need some explanation for contemporary read-

ers. Under natural history, he included not only what we would mean by that term but also the histories of the arts and sciences. Under civil history, he included biographies and chronicles as well as the history of political institutions and affairs. Under ecclesiastical history, he included the history of the church and other religious institutions, practices, and events. Under literary history, he included what we would call social and cultural, as contrasted with narrowly political, history.

This classification of the subdivisions of history raises some questions. Does not natural history, in the sense in which that term is now used for an account of changes in the realm of the phenomena of nature, belong with the natural sciences rather than with political and cultural history? Should not ecclesiastical history, if it is strictly human and not divine knowledge (i.e., not based on Sacred Scriptures or divine revelation), be an element in cultural history? In any case, it is clear that what Bacon meant by ecclesiastical history was concerned only with the institutions and events of the Christian religion. Nothing could have been further from his mind than what we mean by the comparative study of all human religions.

Finally we come to philosophy, the third main division of human learning or knowledge. Here the primary subdivision separates the consideration of the most general principles of all knowledge from the conclusions of special forms of inquiry. This gives us, on the one hand, what Bacon called *philosophia prima*, which corresponds in part, but only in part, to what the ancients called metaphysics. The special disciplines or modes of inquiry are then further subdivided according to the objects with which they are concerned—God, nature, and man. Thus we get a threefold subdivision of the special disciplines into 1) natural, as distinguished from sacred, theology; 2) natural philosophy; and 3) human philosophy.

Once again, it is necessary to translate Bacon's nomenclature into terms more familiar and recognizable to the contemporary world. What Bacon called natural theology, we would refer to as philosophical theology. For the ancients, this would have constituted the concluding chapters of a treatise on metaphysics. What Bacon called natural philosophy, we would separate into the philosophy of nature on the one hand, and all the natural sciences on the other. What Bacon called human philosophy, he subdivided into one part that, dealt with human beings as individuals, and another part that dealt with human beings in aggregate or in association—with human society.

In the part concerned with human individuals, Bacon separated the disciplines concerned with the human body, such as medicine, cosmetics, and cooking, from the disciplines concerned with the human mind and human conduct, which we would call psychology and ethics or moral philosophy.

In treating the part concerned with human beings in association or in society, Bacon used terms for disciplines that we would understand as sociology, economics, and politics (or perhaps as political philosophy) on the one hand, and as the social and behavioral sciences on the other hand. This area he regarded as highly deficient in his own day.

It must be noted that Bacon named metaphysics and mathematics along with physics as the three main branches of natural philosophy. But, as we have already observed, metaphysics as understood by the ancients included what Bacon called *philosophia prima* and also what he called natural or philosophical theology.

An even more questionable point is Bacon's inclusion of mathematics as a subdivision of natural philosophy. Mathematics as understood by the ancients stood apart from physics, as did metaphysics. Neither provided knowledge of natural phenomena. Only physics deals with the realm of becoming—matter in motion and all the phenomena of change. While we today recognize the manifold applications of mathematics in physics and in other natural sciences, we also regard it as a discipline quite distinct from those investigative—empirical or experimental—sciences. Mathematics is neither empirical nor experimental.

Under human philosophy Bacon included what he called the intellectual arts—arts that use the intellect for one purpose or another. In place of what the ancients referred to as the liberal arts and the Middle Ages categorized as the linguistic arts (grammar, rhetoric, and logic) and the mathematical arts (arithmetic, geometry, music, and astronomy), Bacon treated all the intellectual arts as if they were branches of rhetoric and subsumed thereunder both logic and grammar. He entirely omitted the mathematical arts.

Bacon's concern with logic concentrated mainly on the art of discovery, or what we might call the methodology of the empirical or experimental sciences. In this respect he parted company with the traditional conception of the sphere of logic, which is based on Aristotle's *Organon*—his treatise on the subject. That is why Bacon

called his treatment of the same subject a *Novum Organum*—a new logic or methodology.

## *Thomas Hobbes* [1588–1679]

The book by Thomas Hobbes in which we find his scheme for the organization of knowledge and his map of human learning is the *Leviathan*, published in 1651. That treatise was primarily a work in political philosophy dealing with the state and man in relation to the state. But in the opening section of the work (which concentrates on the nature of man), Chapter 9, following chapters that deal with the operations of the human mind, is entitled "Of the Several Subjects of Knowledge." Quoting it in its entirety may be the most useful way of introducing the reader to the map or chart of learning that Hobbes presented.

> There are of knowledge two kinds, whereof one is knowledge of fact; the other, knowledge of the consequence of one affirmation to another. The former is nothing else but sense and memory, and is *absolute knowledge*; as when we see a fact doing, or remember it done; and this is the knowledge required in a witness. The latter is called *science*, and is conditional; as when we know that: *if the figure shown be a circle, then any straight line through the center shall divide it into two equal parts*. And this is the knowledge required in a philosopher; that is to say, of him that pretends to reasoning.
>
> The register of knowledge of fact is called *history*, whereof there be two sorts: one called natural history, which is the history of such facts, or effects of Nature, as have no dependence on man's will; such as are the histories of metals, plants, animals, regions, and the like. The other is *civil history*, which is the history of the voluntary actions of men in Commonwealths.
>
> The registers of science are such books as contain the demonstrations of consequences of one affirmation to another; and are commonly called *books of philosophy*; whereof the sorts are many, according to the diversity of the matter; and may be divided in such manner as I have divided them in the following table. . . .

The table referred to presents a schematic diagram, the overall heading of which is "SCIENCE . . . which is called also PHI-

LOSOPHY." Under this heading, the major division is that between natural philosophy and civil philosophy, or politics.

Natural philosophy includes, first of all, a group of disciplines, the topmost of which is the most general in its consideration of the principles underlying all other disciplines. This, Hobbes, like Bacon, called *philosophia prima*. The other disciplines in this group, less general, include mathematics, cosmography, and mechanics. Mathematics is then subdivided into arithmetic and geometry; cosmography into astronomy and geography; and mechanics into engineering, architecture, and navigation.

What is surprising about this is not that *philosophia prima* and mathematics are here sharply separated from the second main group of disciplines under natural philosophy, but rather that astronomy and engineering are separated from physics, which is the name that Hobbes used to designate the second main group.

In that second group we find not only such special disciplines as meteorology, astrology, and optics, but also music. In addition, and even more surprising, we find ethics, poetry, rhetoric, logic, and jurisprudence.

In all the respects that I have called surprising, Hobbes departs not only from Bacon's more traditional scheme, but also even more so from the maps of knowledge and learning that were dominant in antiquity and the Middle Ages. Hobbes entirely omits theology from his scheme of things, not only excluding divine philosophy, or sacred theology, but also philosophical or natural theology. His subsuming of ethics or moral philosophy under the branch of natural philosophy he calls physics is as unintelligible as his inclusion under the same heading of poetry and of logic and rhetoric. History is nowhere to be found in this map of learning.

The second main subdivision of science or philosophy, which Hobbes called politics, or civil philosophy as distinguished from natural philosophy, deals, of course, with the institutions of the state, with the rights and duties of the sovereign and the rights and duties of subjects. But here we are impelled to ask why ethics (which certainly treats of rights and duties) and jurisprudence (which Hobbes called the science of the just and unjust) should be so sharply separated from politics, appearing to have no relation to its concern with rights and duties.

Even though Book I of the *Leviathan*, in its treatment of human nature and the operations of the mind, deals with matters that we

would consider to be psychological, psychology is omitted from Hobbes's scheme; and so, too, is economics, even though wealth and property have obvious relevance to the subjects treated under the head of politics or civil philosophy.

### *John Locke* [1632–1704]

Book IV of Locke's great *Essay Concerning Human Understanding*, published in 1689, contains a chapter (numbered XXI) entitled "Of the Division of the Sciences."

Its opening paragraph sets forth a threefold division: the first is concerned with the nature of things and is called physics or natural philosophy; the second is concerned with human conduct and is called ethics; and the third is concerned with the use of language and is called either the doctrine of signs or logic.

As compared with the organization of knowledge and the mapping of the sphere of learning advanced by Bacon and Hobbes, Locke's tripartite scheme is both simplistic and inadequate. That the three disciplines constituting his scheme represent important and distinct disciplines cannot be questioned. But what about poetry, history, politics, mathematics, metaphysics, and theology? They cannot be fitted into his scheme.

It is also important to note that Locke adds nothing to the tripartite scheme that the Roman Stoics thought sufficient when they divided all of human learning into logic, physics, and ethics.

The picture changes remarkably as we turn now from the seventeenth to the eighteenth and nineteenth centuries.

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